Amendment to the claims

28. An apparatus for recording environmental data measurements, comprising:

a sensor for detecting environmental data;

a controller for controlling the operation of the sensor, the operation of the sensor including a plurality of operation modes automatically selected by the controller.

29. The apparatus of claim [[1]] 28, wherein the controller further comprises:

a front-end circuit coupled to the sensor;

a loop filter coupled to the front-end circuit;

a multiphase clock generator coupled to the front end circuit and the loop filter;

a startup sequencer coupled to the loop filter and the multiphase clock generator;

a sensor simulator for simulating the performance of the sensor coupled to the startup sequencer, the multiphase clock generator, and the front-end circuit; and

an overload detection device coupled to the loop filter and the startup sequencer.

30. The apparatus of claim [[1]] 28, wherein the controller comprises:

a front-end circuit for providing electrostatic forces and position sensing for a measurement mass in the sensor, the front-end circuit including:

a plurality of switches for controlling the operation of the sensor; and

a sense amplifier for sensing the position of the measurement mass within the sensor.

31. The apparatus of claim [[1]] 28, wherein the controller further comprises:

a loop filter for providing control to the sensor apparatus, to the loop filter including:

one or more integrators for providing a signal for controlling the sensor system;

one or more derivative controllers for providing a signal for controlling the sensor system;

one or more proportional controllers for providing a signal for controlling the sensor system; and

a summer for combining the signals from the integrators, the derivative controllers, and the proportional controllers.

32. The apparatus of claim [[1]] 28 further comprising:

a multiphase clock generator for providing clock signals for controlling the operation of the apparatus, the clock generator including:

a digital signal generator; and

a data-independent clock resynchronization circuit coupled to the digital signal generator for resampling clock signals.

33. The apparatus of claim [[1]] 28 further comprising:

a sensor simulator for simulating the operation of a sensor, the simulator including;

a filter adapted to receive one or more input signals and generate an output signal representative of the operating state of the sensor; and

an input signal selector operably coupled to the filter adapted to controllably select the input signals as a function of the simulated operating state of the sensor.

34. The apparatus of claim [[1]] 28 further comprising:

a device for testing the operation of the controller, the device comprising;

a sensor simulator for simulating the operation of a sensor; and

a second controller coupled to the simulator.

35. The apparatus of claim [[1]] 28, wherein the controller further comprises:

a feedback control system for providing control to the apparatus, the feedback control system comprising:

a startup sequencer for selecting the mode of operation of the feedback control system; and

a loop filter coupled to the startup sequencer.

36. The apparatus of claim [[5]] 32, wherein the clock resynchronization circuit comprises:

a plurality of inverters;

a plurality of NOR gates coupled to the inverters;

a plurality of NAND gates coupled to the inverters;

a plurality of XNOR gates coupled to the NAND gates and the inverters;

a plurality of asynchronous set double-edge flip-flops coupled to the NOR gates; and

a plurality of asynchronous reset double-edge flip-flops coupled to the NOR gates.

37. A method of controlling the operation of a sensor assembly, comprising:

using a controller to apply electrostatic forces to a sensor to create one or more sensor operating states; and

sequentially arranging the operating states into which the sensor is placed to create a plurality of operating modes for the sensor assembly.

38. The method of claim [[10]] 37 further comprising:

determining an operating mode of the sensor assembly;

adjusting a mode of operation of a loop filter in the sensor assembly;

providing feedback loop compensation to the sensor assembly during a start-up mode of operation for the sensor assembly; and

providing noise shaping to the sensor assembly during a sigma-delta mode of operation for the sensor assembly.

39. The method of claim [[10]] 37, wherein the sensor assembly includes a loop filter, one or more integrators, a proportional controller, the method further comprising:

placing a loop filter including one or more integrators, a proportional controller, and a derivative controller in a reduced-order operating mode;

sending a signal to the loop filter to control the operating mode of the loop filter; and

holding the integrators within the loop filter in a reset mode to place the loop filter in the reduced-order operating mode.

40. The method of claim [[12]] 39 further comprising:

taking the integrators out of the reset mode to place the loop filter in a normal operating mode when the sensor system is operating in a sigma-delta operating mode.

41. The method of claim [[12]] 39, wherein the operating mode of the loop filter further comprises:

sending a signal to the loop filter indicating an operating mode of the sensor assembly;

operating the loop filter in a reduced-order mode while the sensor assembly is operating in a start-up mode;

operating the loop filter in the reduced-order mode for a predetermined period of time after the sensor assembly transitions from the start-up operating mode to a sigma-delta operating mode; and

operating the loop filter in a normal mode during the sigma-delta operating mode after the predetermined period of time during which the loop filter operates in reduced-order mode.

42. The method of claim [[14]] 41, wherein the operating mode of the loop filter further comprises:

operating the loop filter in a reduced-order mode while the sensor assembly is operating in the sigma-delta operating mode.

43. The method of claim [[10]] 37 further comprising:

generating a clock signal for the sensor assembly, the generating including:

generating a first clock signal; and

resampling the first clock signal to generate a second clock signal to restore signal integrity and providing a timing relationship.

44. The method of claim [[10]] 37 further comprising:

resampling an input signal to the sensor assembly, the resampling including:

resampling the input signal in a first level-sensitive latch, including one or more transmission gates, one or more NOR gates, and one or more inverters, on one edge of a clock input signal; and

resampling the input signal in a second level-sensitive latch, including one or more transmission gates, one or more NOR gates, and one or more inverters, acting in parallel with the first level-sensitive latch, on another edge of the clock input signal.

45. The method of claim [[10]] 37 further comprising:

resampling an input signal to the sensor assembly, the resampling including:

resampling the input signal in a first level-sensitive latch, including one or more transmission gates, one or more NAND gates, and one or more inverters, on one edge of a clock input signal; and

resampling the input signal in a second level-sensitive latch, including one or more transmission gates, one or more NAND gates, and one or more inverters, acting in parallel with the first level-sensitive latch, on another edge of the clock input signal.

46. The method of claim [[10]] 37, wherein the controller includes an analog control circuit, the method further comprising:

operating the analog control circuit by generating a first clock signal;

resampling the first clock signal to generate a second clock signal to restore signal integrity and provide a proper timing relationship; and

driving the analog control circuit using the second clock signal.

47. The method of claim [[10]] 37 further comprising testing the controller, wherein the test comprises:

connecting a sensor simulator to the controller;

supplying an input signal of a known value to the sensor simulator;

converting the input data to the sensor simulator into an output stream from the sensor simulator;

sending the output stream from the sensor simulator to the controller;

processing the output stream from the sensor simulator within the controller to create an output stream from the controller; and

analyzing the output from the controller to determine the accuracy of the controller.

48. The method of claim [[10]] 37 further comprising:

offsetting the effects of external acceleration forces on the sensor assembly independent of sensor assembly orientation by applying electrostatic forces to a sensor element to offset the effects of the acceleration force.